

Taking the helm

By Franklin O'Donnell

Watkins stresses employee empowerment, collaboration in first interview as director

Michael Watkins held his first all-hands meeting in early August as JPL's new director. Watkins sat down with Universe shortly before the meeting to share his thoughts on the Lab and its future.

Do you have an overarching message for the JPL workforce that you are sharing at the all-hands?

Yes. The first one is just to remind everyone of the challenging work we have right now and how important it is to be successful. The second is that, to be successful, we need to be sure we have the right eyes looking at everything, and we need to have the right workforce.

Part of the answer is putting people in the right place—whether regular JPL employees, early career hires, or on-site contractors. For our new employees we want to make sure that we're mentoring and training them and they are benefitting from our experienced engineers, while at the same time being open to their contributions. New people can bring a lot of new technological solutions, a lot of fresh ideas.

We also need to nurture our partnerships with other institutions and NASA centers. Some of these activities do not show immediate results, but we want to be strategic with NASA and our industry



Josh Krohn / JPL Photo Lab

JPL's success depends on smart deployment of people, says new Director Michael Watkins.

partners so we know who best to turn to for support in the future.

In thinking about your own style of managing, do you have a particular approach or philosophy that you're trying to implement? When historians look back at the Watkins years, will there be a theme behind it?

That's a good question. I think all of us at JPL, myself included, really want to work on the hardest problems that NASA has. So part of our strategy is to focus on those jobs that only we can do, and use our partners effectively to help get the

whole job done. That's really what makes us JPL, and it's how we contribute best as a national laboratory.

From the people perspective, I'm a big believer in empowerment and letting folks bring to the table the skills they have and the ideas they have. We certainly need alignment on direction, but followed by flow down of authority to where it maximizes our efficiency. And so I really expect folks at the lab to feel that sense of empowerment and to feel free to innovate and to bring their ideas forward. I think that's always been a part of JPL, but

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I want to reiterate that that is of utmost importance.

You've made some changes to the Executive Council. Do you view those as minor midcourse corrections to balance out skill sets and workloads, or was there more at work?

It's a combination of wanting to strengthen a couple of areas, and then redeploying forces to where they're most useful. We're beefing up the office of the Associate Director for Flight Projects and Mission Success, putting one of our most experienced managers in charge of the Solar System Directorate, and making other changes to achieve similar goals. I think it's good for people to move around a bit, to see the world from different vantage points. That's what we need right now, because we're going into a busy period where folks are going to have to work even more closely together. We need for each member of the Executive Council to understand the needs of the other areas. By having some movement in assignments I believe it's really going to help us all to see the larger picture and work together in a more integrated way.

Your own career at the lab would seem to be a good example of that, as you have moved between engineering and science, between Earth science and Mars exploration. How did all that come about?

It's easier to explain what happened than what the plan was, because I'm not sure it resulted from any plan. *[Laughs.]* I originally came to JPL in the Communications, Tracking and Radar Division in part to make a mission called GRACE happen. I had come up with the basic ideas for

"I don't see science and engineering and management as being all that different. We're all trying to get a job done. You need engineering to get the science done, and you need management to get the engineering done."

— Michael Watkins

that mission when I was a young faculty member at the University of Texas back in the early '90s. At the same time, I had been doing a lot of work in geodesy—the use of the Global Positioning System, or GPS, as a scientific tool, not just to navigate your car. At the time, using GPS for science was in its infancy. Since I was trained in that subject, it gave me an opportunity to help push GPS forward and really make it the kind of high-powered scientific tool that it is today for earthquake research and other activities.

The JPL organization I was in was closely related to the Navigation and Mission Design Section, although it was in another division. Around the time of Mars Climate Orbiter, I was asked to go take over that section to help bring a new approach emphasizing technical innovation and modernization. We had a chance to build that section up, and that really introduced me 24/7 to the rest of JPL, not just the research part of JPL I had been working in, but the mainstream in terms of all our missions. I really enjoyed it. I was very happy doing research, as a scientist and a research engineer, but I also really enjoyed being thrust into operations and flight project development for planetary missions. I thought, well, this is fantastic, and this is what the lab really does, it's opening a door to a whole new world.

While I was doing that, I could still do science connected with GRACE part time—basically on the weekends, so that was nice. But in my section management I had a lot of interaction with the Mars Exploration Rover team, and I really liked the spirit of that team—I liked their energy. So when the opportunity arose to come on Mars Science Laboratory as the mission manager, I jumped at it and that was quite an experience. It's amazing to be part of something like that, that big and that exciting. It was a chance again to do management and some engineering and science, because of course science is a critical part of operations. Using my experience as a scientist helped me be effective in that job.

And then after that, I managed the Science Division. I don't know that there was a grand strategy, but maybe it just shows that I like to do a lot of different things.

So you wore many hats as scientist, engineer and manager.

Yes. One important point I'd like to make is that I don't see science and engineering and management as being all that different. We're all trying to get a job done. You need engineering to get the science done, and you need management to get the engineering done. They are all

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integrally related. Sometimes we think of them as being completely different, but I don't think they are. In my opinion, the greatest strength of JPL is the close working relationships and the fluidity of those roles. It's something that's been a theme in my career, and I think it can benefit other people's careers as well.

What have been the influences on your life—people or major events that shaped you? What's helped to make Mike Watkins Mike Watkins?

I grew up watching Apollo—watching the astronauts at one of NASA's high points, realizing that I should be involved in that. These are some of the greatest endeavors in the history of mankind. Later, I think I was in late high school or early college when the Voyagers did their early flybys, and I realized that planetary exploration was an equally valid part of that exploration paradigm. Watching *Cosmos* on television added to the notion that that was a great era of exploration that I was intrigued by. I did like the idea of being a scientist full-time. At the same time, my Ph.D. is in aerospace engineering, so again I liked that interplay.

From a personal perspective, I had a lot of influences. I played a lot of tennis as a kid, and wanted to be a professional tennis player. I played tennis probably more than I did anything else in my life except go to school.

I also love reading, especially history—thinking about our place in history. In college I even thought about majoring in classics, and took a lot of classes in that area. So I like to think about what history teaches us about things we've done right and wrong. In some cases, even about

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— *Michael Watkins*

management—what are ways to empower people, what cultures have been successful, what management approaches have been successful.

Could you say a bit about your family, where you grew up?

My father's from Louisiana, but he was in the military, so I was born in Newfoundland, Canada. I always joke with our Canadian colleagues here that I'm part Canadian. Then we moved around—I spent several years in the Philippines, and then my parents retired to Texas. That's where I went to high school and then graduate school.

When you left JPL last year to join the University of Texas, what kind of perspective did that give you? Do you think it's going to be helpful to you?

I could answer that in two ways. One is from the personal perspective; I left thinking I was going away, and it's a big emotional step to move away, move to a new place. And that made me invest and try very hard to learn how to operate in a new environment there at the university as a faculty member and a research director—to go back into listen mode and learning mode, because it's a different

job and you have to learn how to do that new job. That helps me here, because it caused me to go back and look at things from first principles.

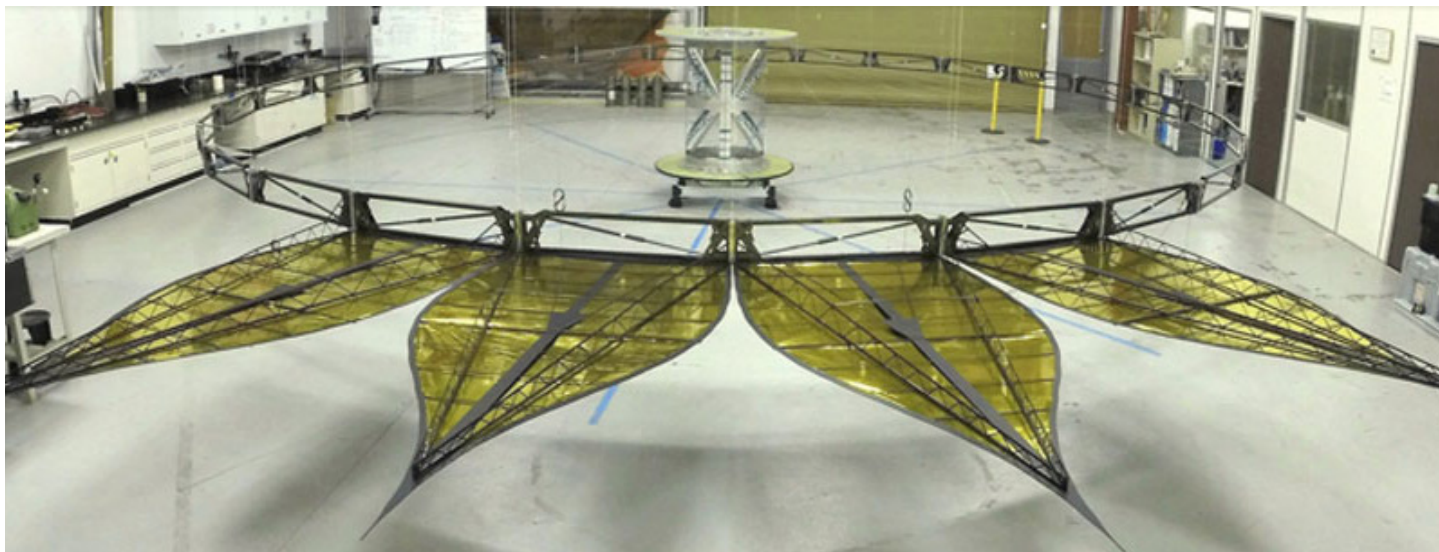
Also, when you're outside of JPL and look at JPL from the outside, people talk to you differently. I heard about areas where we could do better. That's partly what sparks my interest in making sure that we increase our partnerships and our interactions with folks outside of the lab.

Why did you want the job of JPL director?

Because I think JPL is a national treasure. What we can do for the world here is enormous. It's the quality of the people, the quality of the work we have. It's our ability to influence the way we get work done and what we can do for the country. I enjoyed very much my time in Austin but, you know, the opportunity to have this role in a lab that has as much impact as JPL was really a once-in-a-lifetime experience. If you've been at JPL long enough, you realize how great JPL is—how the capabilities of the people here, the lab and campus, are really unparalleled. It's just wonderful to be such a key part of something like this.

Blocking out the sun

Starshade developments advance for a better view of exoplanets



JPL's development of starshade technology is underway. Above, portions are on display at a testbed on Lab.

With an eye on new ways to discover potentially habitable new worlds, NASA is looking into using JPL's starshade technology on the Wide Field Infrared Survey Telescope.

The agency recently directed the WFIRST project, which is managed by Goddard Space Flight Center, to incorporate starshade compatibility into the design reference mission for phase A. WFIRST is planned for a mid-2020s launch.

It's good news for JPL, which has been developing starshade technology and is also responsible for delivering a coronagraph instrument to the WFIRST mission, said Gary Blackwood, manager of NASA's Exoplanet Program Office at JPL. The technology for starshades and coronagraphs are both used for direct detection of exoplanets.

"This is not an official go-ahead" to use JPL's starshade in the mission, but NASA's decision is a step toward that possibility, Blackwood said.

Starshades are designed to help space-based telescopes view dim planets next to much brighter stars by blocking light from the star. The starshade positions itself precisely between the telescope and the star that's being observed, blocking the starlight before it reaches the telescope's mirrors.

Starshade-based observations could complement the coronagraph-based observations that are already part of the WFIRST baseline mission.

A coronagraph is a telescopic attachment designed to block out the direct light from a star so that nearby objects—which otherwise would be hidden in the star's bright glare—can be resolved.

"The starshade, because of the way it works with the telescope, allows you to see dimmer planets closer to their star," said Blackwood. "Now you're looking at the environments where you can look for habitability and signs of life."

At the moment, WFIRST is the only mission in formulation phase that is targeted

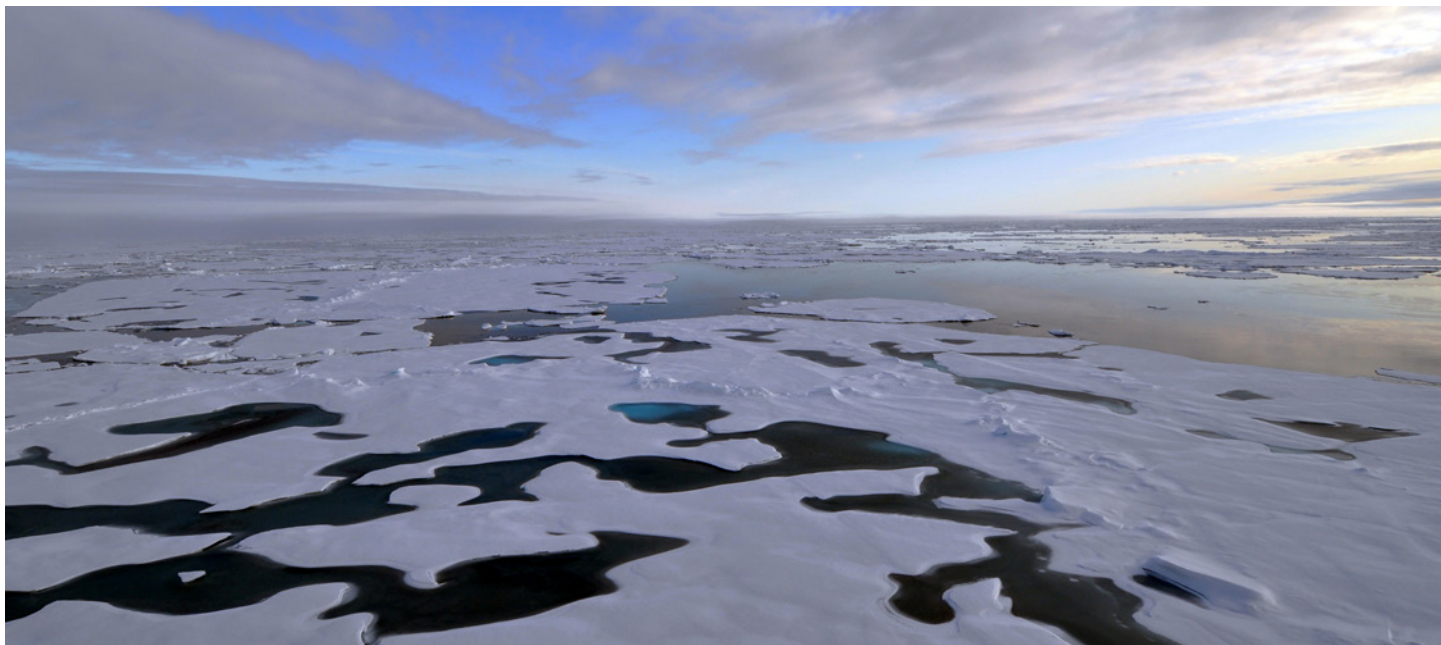
to be ready for a possible starshade. Meanwhile, JPL is participating in two additional large mission concepts, each of which may include a starshade, that NASA plans to submit to the 2020 National Research Council decadal survey for Astrophysics. One, the Habitable Exoplanet Imager (HabEx), could include a coronagraph and/or starshade. The other, LUVOIR (Large Ultraviolet Optical Infrared) is a follow-on to the James Webb Space Telescope and Hubble Space Telescope.

Both of those missions would not only find exoplanets but would view them at a level of precision necessary to see small ones in the habitable zone, and look for signs of life. The hope, said Blackwood, is to have the concepts prepared to a sufficient technology readiness level to be considered for the 2020 National Research Council decadal survey.

Blackwood also noted that JPL recently established a Starshade Technology Project to focus efforts for the Lab's efforts.

Apples to apples

Study shows about 20% of climate change not accurately measured



A U.S. Coast Guard photo shows thinning ice over the Arctic Ocean.

Patrick Kelly, U.S. Coast Guard

To achieve success, it's critical for researchers to have confidence in their methods—particularly when it comes to studying the effects of global warming on our home planet.

Scientists have long relied on historical records to supply key data on past global temperatures. But a newly published study led by JPLer Mark Richardson has revealed why climate projections—based solely on historical records—estimate lower rates of warming than predictions from climate models. This was because almost 20 percent of the global warming from the past 150 years has been missed by such records due to quirks in how global temperatures were recorded.

“If we only have one line of evidence that points to a result, then we’re less confident in it,” said Richardson. “If different ways all point at the same sort of answer, we’re more confident.

Using the Arctic as a key example, Richardson pointed out that we know it's warming as its sea ice is melting, but there are fewer long-term thermometer records from the region. The study only used climate-model output where thermometers were present, and then performed the same calculations on both the models and the observations to make the first true apples-to-apples comparison of warming rates. With this modification, the models and observations largely agree on expected near-term

global warming.

The study noted that the historical data mix air and water temperatures, whereas most model results referred to air temperatures only. Also, when temperature records began in the 1860s, there was considerably more Arctic sea ice and early observers recorded air temperatures over nearby land areas for the sea-ice-covered regions. As the ice melted, later observers switched to water temperatures instead, which also pushed down the reported temperature change.

Regarding the amount of global warming that would happen after carbon dioxide is added to the air, said Richardson, it used to appear that one calculation using real-world temperature data gave a lower answer (i.e., less warming) than climate models. “People hadn’t realized that apples-to-oranges comparisons make such a big difference in calculations of how much global warming we expect from carbon dioxide. Our results show that the data agree with the models.

“Air warms less than water over the oceans, so if you compare air temperature from models with water temperature from the measurements, it can look like the real world isn’t warming as much, even if it actually is,” added Richardson. “We made sure to take water temperatures from the models to match with the

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News Briefs

Six named to academy

Six JPL employees were recently elected as members of the International Academy of Astronautics. The honorees and their appointments to the academy:

Deputy Director Larry James, member, Basic Science Section; Office of Safety and Mission Success Director Janis Chodas, corresponding member, Engineering Sciences Section; acting director for Solar System Exploration Richard Cook, corresponding member, Engineering Sciences Section; Director for Interplanetary Network Keyur Patel, corresponding member, Engineering Sciences Section; Research Fellow Robert Green, corresponding member, Basic Sciences Section; Director for Communications and Education Blaine Baggett, corresponding member, Social Sciences Section; Slava Turyshev, research scientist, corresponding member of the Basic Sciences Section.



Yoseph Bar-Cohen

Book probes low-temp materials

Yoseph Bar-Cohen, supervisor of the Electroactive Technologies Group (355N) and a Senior Research Scientist, is the editor and co-author of "Low Temperature Materials and Mechanisms," his eighth book.

The book covers the state of the art in materials and mechanisms that are operational at low temperatures. Leading experts in specific subject areas addressed various related science and engineering topics including chemistry, material science, electrical engineering, mechanical engineering, metallurgy and physics. Twelve chapters of the book were co-authored by JPLers, including seven by Bar-Cohen.

"To enable science capabilities that provide a significant leap over what was achieved in prior missions, in-situ exploration of extremely cold bodies like Europa, Titan and Enceladus poses numerous challenges and requires performing tasks that are at and beyond the technology edge," said Bar-Cohen.

Information about the 500-page book is available at <https://www.crcpress.com/Low-Temperature-Materials-and-Mechanisms/Bar-Cohen/p/book/9781498700382>.

Wang honored for particle research

Yuan Wang of the Aerosols and Clouds Group has been selected for the American Geophysical Union's Atmospheric Sciences Section 2016 James R. Holton Award.

A Caltech postdoctoral scholar, Wang is recognized for his seminal contributions in elucidating the role of natural or human-made atmospheric particles in air quality, cloud physics and climate change. He has produced 22 publications in high-impact journals such as *Nature Climate Change*, *Nature Communications* and others.

Wang will receive the prize during the union's December meeting in San Francisco.

Passings

Paul Robinson Jr., 74, a retired Principal Scientist with JPL from 1980 to 1996, died June 29.

Robinson served as supervisor of Section 513's Space Environments Group and as deputy to the JPL chief technologist. After retiring, he taught at Principia College in Illinois from 1994 to 2006.

Robinson is survived by his wife, Rosemary, daughters Charlotte and Mary, and four grandsons. For information on donations and memorial, visit <http://www.never-gone.com/Memorials/Pogo>.



Paul Robinson Jr.

Neal Ausman, 80, retired Galileo mission director, died July 15.

Ausman worked at JPL from 1967 to 1997 and contributed to many missions including Mariner, Pioneer, Helios, Viking and Voyager. He was the manager of the Mission Operations Section and mission operations system manager for Galileo prior to being appointed mission director.

Ausman is survived by his wife, Shelagh, daughters Lisa and Christy and four grandchildren.

Letters

I would like to thank my JPL friends and co-workers for the cards, flowers and plant following the death of my brother. He was always an encouraging and supportive sibling. He even taught me how to drive a stick shift on the hills of San Francisco! I am sure he would've been happy to know that I am surrounded by such kind and caring people. Your support has been a great comfort.

Gay Hill

Retirees

The following JPL employees recently announced their retirements:

June

Raymond Becker, 51 years, Section 353J; **John Hunter**, 44 years, Section 1610; **Peyton Bates**, 41 years, Section 3410; **Charles Avis**, 39 years, Section 398A; **Eni Njoku**, 38 years, Section 329F; **Marie Jose Deutsch**, 37 years, Section 312A; **James Margitan**, 36 years, Section 3200; **David Cuddy**, 31 years, Section 398B; **Sharon Harriman**, 25 years, Section 5030.

May

Patrick Beyer, 37 years, Section 9210.

Classifieds

Ads submitted July 23 to 29.

For Sale

DESK for student, with 7 drawers, \$50. 818-957-8614, Mina.

MISC.: Mini steam iron, Rollerblades (men's 8), Bloody Mary set, stemless decanter set, board games. 818-272-3262.

Wanted

SPACE INFO/memorabilia from U.S. & other countries, past & present, for personal use (see <http://www.youtube.com/watch?v=S7PvjGp7mCU>). mrayman@alumni.princeton.edu, 818-790-8523, Marc Rayman.

UPRIGHT BASS CASE, hard, ¾ size, for air travel. 818-437-3513, Susan.

For Rent

ALTADENA, furnished rm. w/awesome view for lease; non-smoker to share a beautiful 4-bedrm., 3-bath house across from community garden; close to colleges/schools, route to Kaplan, walk to JPL; utilities incl., cent. air/heat, internet access; nr. 210/134/110, bus stop, shopping, banking, restaurants; \$800/mo. 818-370-0601.

ALTADENA (91001), share furn. 2-bedrm., 1 3/4-bath condo; security access & gated, security alarm ready, central air/heat, internet access, well maintained, carport parking, nice closet organizers, kitchen w/marble floors, refrigerator/stove/microwave, washer/dryer, den, fireplace, patio w/garden and hot tub, community pool, more; utilities incl., trash & water; \$1,290/mo. 626-798-6185.

ALTADENA (91001), furn. loft w/awesome view for lease; non-smoker to share a beautiful 4-bedroom, 3-bath house across from community garden; close to local colleges, Pasadena schools, walk to JPL; utilities incl., cent. air/heat, internet access; near 210/134/110 /bus stop/shopping/bank/entertainment/restaurants; \$740/mo. 818-370-0601.

ALTADENA (91001), 2-bedrm, 1 3/4-bath condo; security access & gated, alarm, cable internet ready, central air/heat, well maintained, carport parking, nice closet organizers, kitchen w/marble floors, washer/dryer, den, fireplace, patio w/garden + hot tub, community pool and more; you pay

CLIMATE *Continued from page 4*

observations. Water warms less because of changes in the greenhouse effect, how much sunlight reaches the surface and how, as it gets hotter, more water evaporates. It's as if the ocean surface 'sweats' more to reduce how much it heats up, and it dumps this heat into the air."

Richardson noted the advanced work by Berkeley Earth, a California-based non-profit focused on land temperature data analysis for climate science.

"They have some clever statistical methods that let them use more data, letting them 'stitch together' short-term temperature records," he said. "Other teams might address some of the same issues, finding unique ways to bring in more real-world data. Or at least other scientists who are testing models will know how to correctly compare real-world historical temperature data with models now so they can do a real fair test."

Richardson's study was recently published in the journal *Nature Climate Change*.

utilities excld. trash; \$1,875/month. 626-798-6185.

PASADENA, 2 furn. rooms in a lovely 4-bd./2-bath house, big backyard, hardwood floor, big closet, shared bathrm., kitchen/laundry privileges; 2 miles to JPL, close to public transport; short- or long-term lease avail.; must like dogs and be very clean; \$800 and \$850 + \$800 deposit. 818-960-8654.

Vacation Rentals

BALBOA ISLAND, 2 bedrooms, 1 bath, deck w/BBQ, sleeps 5, remodeled in 2010, walk to main street restaurants, shopping, bay and ocean; special weekly rates for JPLers; Bettyrs@earthlink.net or 626-429-3677.

JACKSON HOLE, WY: Luxurious bed & breakfast on 3 acres of solitude on Snake River near Jackson Hole Mountain Resort and Grand Teton Natl. Park; see <http://www.bentwoodinn.com/>; JPL discount. info@bentwoodinn.com, 307-739-1411.

MAMMOTH, Snowcreek, 2 bd., 2 ba. + loft, sleeps 6-8, fully equip'd kitchen incl. microwave, D/W, cable TV, VCR, phone, balcony w/mtn. vw., Jacz., sauna, streams, fishponds, close to Mammoth Creek, JPL discount, no pets. 626-798-9222, 626-840-3749 or valeriee@caltech.edu.

MAMMOTH, Snowcreek, beautiful updated condo, 2 bd., 2 ba. + loft (sleeps 6-8), great location by pond/meadow, new appliances, TVs, DVD players, free wireless Internet and washer/dryer, no pets. 818-952-2696 or BigMtnPrettySky@gmail.com.

MAMMOTH, remodeled 2 bed/2 bath + loft, short walk to Canyon Lodge; Courchevel 6 features full kitchen, cable/Internet TV, DVD, Blu-Ray, wireless hi-speed Internet, 2-car garage, Jacuzzis, grill, pool; no pets. <http://Courchevel6.com>.

MEXICO (1 bedrm.): Mayan Palace: Acapulco, Nuevo Vallarta, Riviera Maya, Puerto Vallarta; Sea Garden: Acapulco, Nuevo Vallarta, Mazatlan; trades available with II and RCI. 818-272-3262.

SAN FRANCISCO, Inn at the Opera; Opera Unit can sleep 4 people, 1 bd., 2 sitting rooms, 2 bath, 498 sq.', buffet b/fast included; available 4 nights beginning Dec. 31, 2016; see www.shellhospitality.com/Inn-at-the-opera. margialden@sbcglobal.net.



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Universe

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